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Selecting FARM FRAMING LUMBER For Strength

Leaflet No. 481

U.S. DEPARTMENT OF AGRICULTURE

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Selecting Farm Framing Lumber For Strength

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Select for Strength

When you put up a farm building you want it to be strong enough for normal use and to withstand storms.[2] Good framing lumber, properly fastened together, makes a strong building. Framing lumber, known in the trade as dimension lumber, should therefore be selected for strength.

A good way to get strong framing lumber is to buy it in one of the standard strength grades, such as Select Structural, Construction, No. 1, or the like. Your lumber dealer can tell you which of these strength grades are available. The standard strength grades are carefully inspected by a trained lumber grader and have assured strength values.

It is frequently advantageous to buy ungraded lumber for the farm direct from a local sawmill, or to have lumber cut from your own logs by a custom mill or by your own farm mill. The ordinary run of ungraded lumber includes some very strong pieces, many of adequate strength for light frame construction, and some that are weak. Weak pieces can be recognized through visual inspection. If you pick out the strong pieces in a lot of ungraded lumber, you can get a strong substantial building at the lowest cost.

Purpose

This leaflet tells how 2-inch dimension lumber can be selected for strength. The selection method will eliminate the weakest pieces, which make up about 20 to 25 percent of a normal lot of ungraded lumber. The remaining pieces will range in strength from nearly 100 percent down to 40 percent of the strength of clear wood—the range of strength in the standard strength grades of lumber.

Kind of Wood

Any wood that grows straight and can be sawed to the required size of lumber can be used for framing. Some woods are stronger and stiffer than others. Among

[1] Maintained at Madison, Wis., in cooperation with the University of Wisconsin.

[2] "Preventing Storm Wind Damage to Farm Buildings." U.S. Dept. Agr., Agriculture Information Bulletin No. 144.

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the strongest and stiffest are Douglas-fir, western hemlock, western larch, southern yellow pine, white ash, beech, yellow birch, hickory, hard maple, and oak.

About 20 percent lower in strength and stiffness are white fir, eastern hemlock, jack pine, red (Norway) pine, spruce, tamarack (eastern larch), yellow-poplar, sweetgum, tupelo, and white elm.

Another 20 percent lower in stiffness and strength are the cedars, white pine, aspen, and cottonwood.

Woods in the last two groups can be used in the next larger size available to offset the difference in strength and stiffness. For exam-

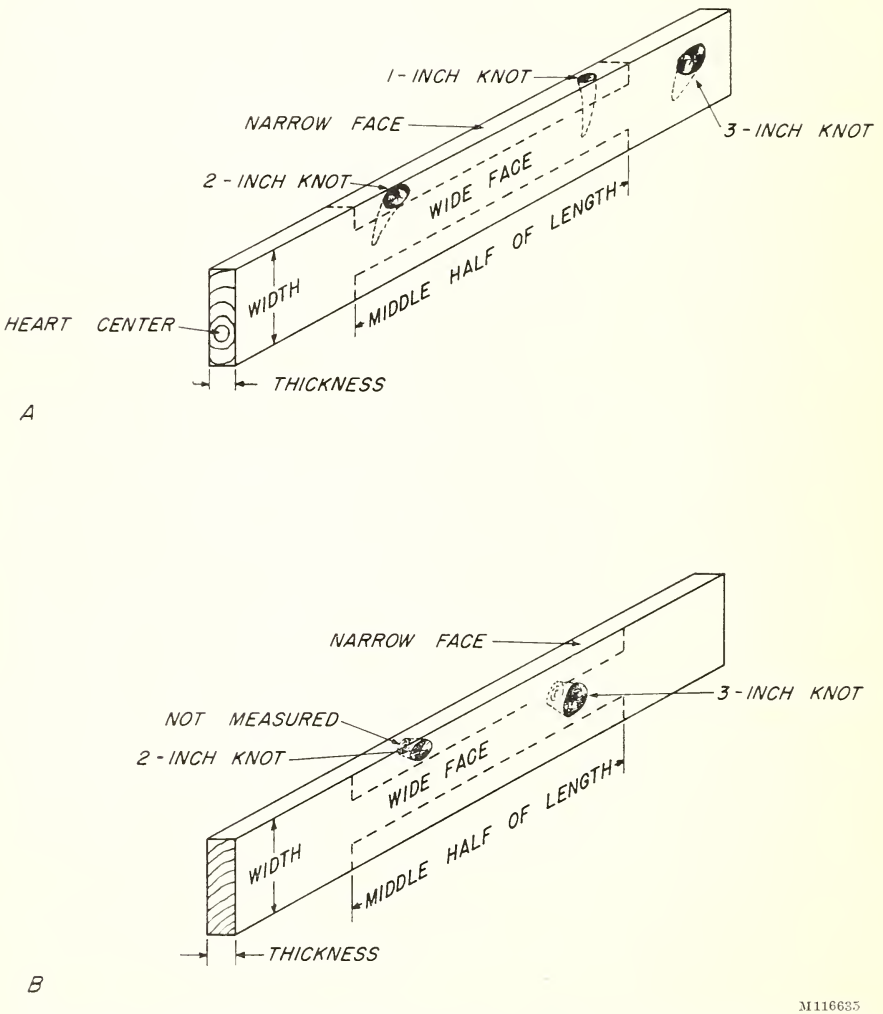

Figure 1.—Largest allowable knots in a 2 by 6; *A*, Piece containing heart center; *B*, piece not containing heart center.

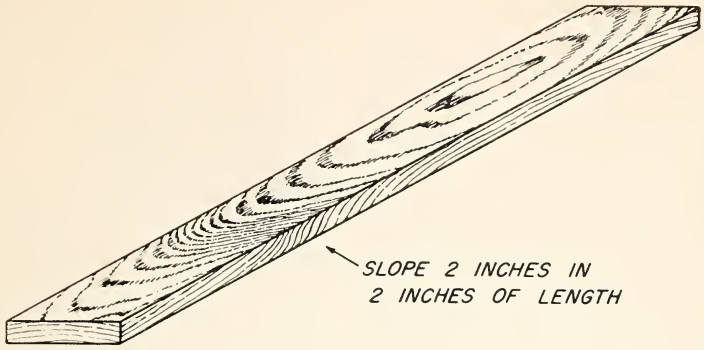

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Figure 2.—Avoid sharp kinks of grain.

ple, if 2 by 8 southern yellow pine will do, use 3 by 8 or 2 by 10 sweetgum or cottonwood.

Rules for Selection

The following rules may be used to select framing lumber of any of the above species:

1. Select clear wood or only pieces with knots or knotholes smaller than one-third the width of the piece if at the edge of a wide face in the middle half of the length, or one-half the width if elsewhere on a wide face.
2. If the piece contains the heart center (pith) of the tree, limit the size of knots in the narrow faces to half the thickness of the piece if in the middle half of the length, with no limit put on knots at ends.
3. Where a knot appears on both a narrow and a wide face of a piece not containing the heart center, limit it for size only on the wide face, as described in Rule 1.
4. Reject pieces with 2 large knots within the same 6 inches of length.
5. Exclude pieces that show rot.
6. Avoid cross grain or sharp kinks of grain if they slope more than 2 inches in 1 foot of length.
7. Exclude pieces that are noticeably undersize.

Knots

Knots can be measured by their average size. When a joist supports a load, the greatest strength is needed along the top and bottom edges near the center of the length—this is why only smaller knots are permitted there. Where a piece does not contain the heart center, a knot in a narrow face will appear also on one of the wide faces and can be measured there. Figure 1 shows the largest allowable knots in a 2 by 6.

Cross Grain

Cross grain is most serious in the middle half of the length. Pay no attention to the kink of grain

around a knot—the permitted size of the knot takes care of it. Figure 2 shows a kink of grain that comes from sawing a crooked log, and is not related to any knot.

Rot

Rot or decay can be detected by the soft punky texture and often shows a brown or a dead white color. A discoloration of the wood sometimes precedes rot—such a discoloration, unless extensive, does not have much effect on strength.

Rate of Growth

In species like pine or Douglas-fir, rapidly grown wood is lower in strength and stiffness and warps more than wood with a normal rate of growth. Avoid pieces with annual rings wider than ¼ inch (fig. 3). Hardwoods such as oak or hickory have good strength, even when rapidly grown.

Size Variation

Some variation in size is normal in rough lumber, though the average before drying is likely to be a little larger than the designated size. Undersize can have a considerable effect on strength—¼ inch undersize in width and thickness reduces the strength of a 2 by 6 by 20 percent. Undersize at the ends has less effect than when in the middle half of the length. Dressing of rough lumber reduces its size and its strength by a similar amount: however, dressed lumber is easier to handle and selection for strength is easier and more reliable.

Green or Dry Lumber

Green lumber is easier to nail, but dry lumber holds nails better. Hardwoods such as oak or hickory, when dry, may require preboring of nail holes. The main advantage in using dry lumber is that it minimizes shrinking and warping after it is put up in the building. This may be a big advantage in house framing.

Protection

Protection of good lumber is well worth while. Green lumber can decay rather quickly in warm

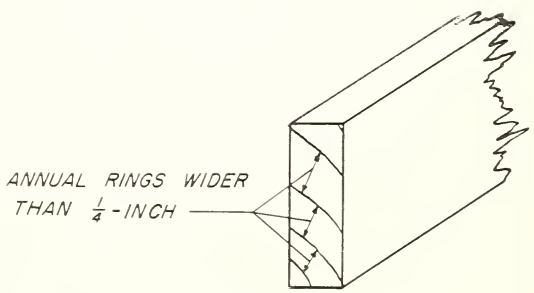

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Figure 3.—Annual rings in rapidly grown wood.

weather. Fast air drying in open piles will eliminate most of the decay hazard. Additional drying will occur in lumber put up in the framework of a building in summer weather. Lumber that is dry when bought should be covered for protection from rain or snow and should be kept out of contact with the ground or with vegetation. If lumber in a building is to be on or near the ground or where it may be frequently wet, preservative treatment will pay for itself by the longer life obtained.[3]

[3] "Preservative Treatment of Fence Posts and Farm Timbers," Farmers' Bulletin No. 2049.

Use of Lumber

Use the best lumber for joists, rafters, or trusses. Pieces rejected by the rule for selection do not have to be thrown away. They can be used as sills or splice plates, or cut to short-length pieces for framing. In cutting to short length, a large defect can often be eliminated, thus making two strong short pieces out of a long weak one.

Strong lumber needs strong fastening at the joints to make it effective. Standard farm building plans, available from the County Agricultural Extension Service, show details of good practice in framing joints.

CHECK up on these accident hazards around your farm . . .

√ Is farmyard clear of tools, broken glass, loose strands of barbed wire, nail-studded boards?

√ Are water tanks, cisterns, and wells protected?

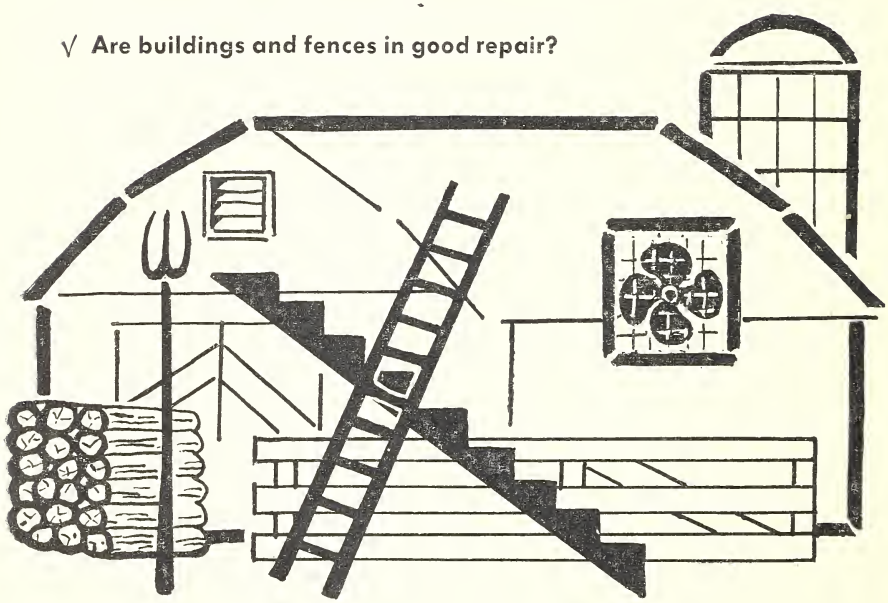
√ Are ladders and steps in good repair?

√ Are pitchforks, rakes, shovels, and other sharp tools kept in racks?

√ Are electric circuits and appliances in good condition?

√ Is unused lumber carefully stacked?

√ Are buildings and fences in good repair?



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to make it attractive and SAFE